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Two days later, May 22, I was drilling flax in another part of the same field, where it had not yet been disced. I was standing on the seed box and keeping a weather eye open for ducks or other birds to flush, when an owl flew up from beside the horses. A short search revealed the nest, containing seven fresh, pearl-like eggs. This nest varied little from the first one found, the main difference being a less amount of lining.

May 31 found me discing in another field of wheat stubble about a mile from that in which the first two nests were found. While driving back and forth across the field, which, by the way, was a mile long and a mile wide, I noticed a number of white objects scattered within a radius of three feet on ground already disced. Upon examination they proved to be owl eggs and only one of the six eggs found was damaged in the least. The nest, located by some white feathers, did not differ markedly from the others. The eggs were incubated one-half.

On Sunday, June 3, another workman on the farm told me of a nest he had noticed the day before. I immediately saddled a pony and rode out to have a look. On that part of the field to which I was directed we had burned off the stubble a week previous. All through the burnt part were small patches of stubble which had been too damp to burn, and it was in one of these that I saw the owl brooding on her nest and glaring at me with wide-open eyes. I rode within ten feet of the nest before she flew off and disclosed a set of seven eggs. Incubation was well along.

It was on June 4 that I found a third owl nest, or more precisely, the remains of a nest, in this same field. I was dragging the disced ground with a six-horse, spike-toothed harrow when I noticed some eggs disappearing under the machine. I managed to find two whole eggs and several shells scattered about, and one week-old owl nearly covered with soil. A nest was manufactured in short order and the owl installed. On the next trip down the field the old bird was seen brooding on her new nest as if nothing had happened.

*Ravinia, Illinois, December 12, 1917.*

## NOTES ON THE NESTING HABITS OF THE WHITE-THROATED SWIFT IN COLORADO

By WM. C. BRADBURY

WITH SIX PHOTOS

**A**FTER the excellent article by Mr. Hanna on the White-throated Swift in the January, 1917, number of THE CONDOR, it might seem superfluous to chronicle my own observations, but the Editor has suggested these might prove interesting, if only for comparison or corroboration.

Early in June, 1916, Mr. J. D. Figgins, Director of the Colorado Museum of Natural History, returning from a mountain trip reported a number of White-throated Swifts (*Aeronautes melanoleucus*) about a promising nesting site near Hot Sulphur Springs, Grand County, in this state. After fully discussing the matter, I provided a quite complete collecting equipment for cliff work, including block and tackle, sailor swing outfit and accessories good for two hun-

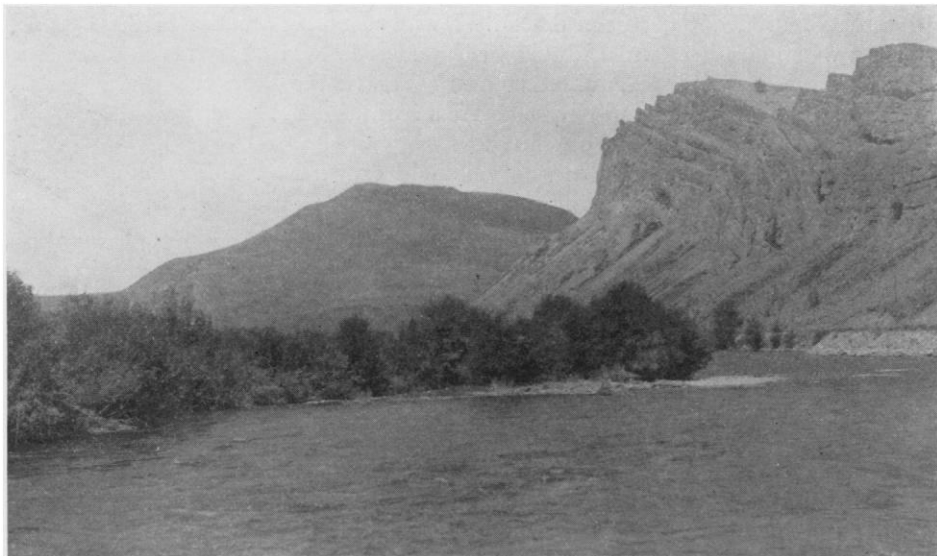


Fig. 13. NESTING SITES OF WHITE-THROATED SWIFT WERE IN THE FACE OF THE BLUFF A LITTLE TO RIGHT OF CENTER OF PICTURE; DEBRIS SLOPE AT BASE; GRAND RIVER, COLORADO, IN FORE.

dred feet of work, rope ladders, anchors, miner's picks, cold chisels, etc. On June 24, with three experienced young assistants, I took train, crossing the Continental Divide at an elevation of 11,666 feet that evening, and located and briefly prospected our ground, two miles distant from our stopping place.

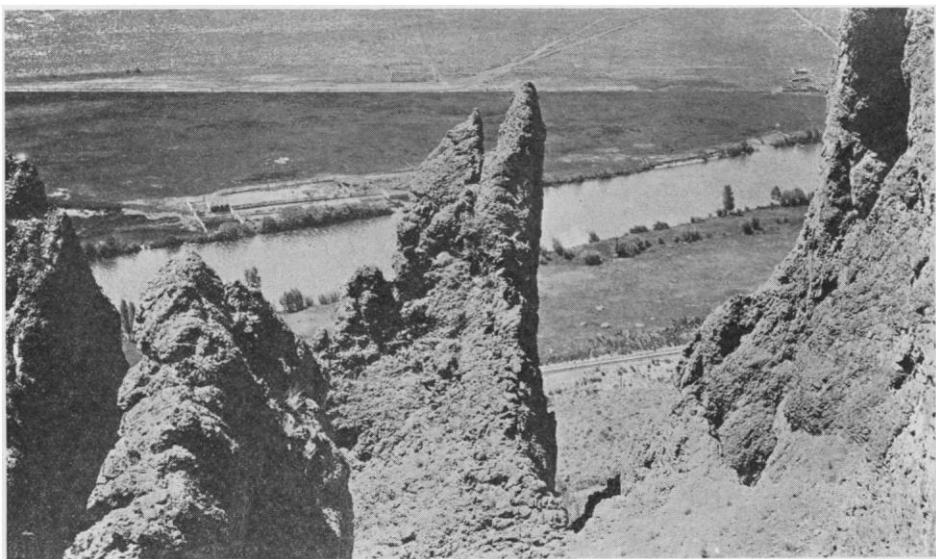


Fig. 14. SHOWING FROM ABOVE AND IN REAR THE SEQUESTERED PINNACLES THE FACES OF WHICH WERE FAVORITE NESTING SITES OF THE WHITE-THROATED SWIFT; GRAND RIVER, COLORADO.

The cliffs where the birds were seen, bordering the Grand River, east of Sulphur Springs, are of a mixed lava formation, with some parts of hard, ringing material, and others of cracked, crumbling formation, intermixed with seams and deposits of soft lava ash, through which the river has cut its way in ages past. The visible base of the cliffs is at the top of a steep slope of debris, extending to the Grand River several hundred feet below (see fig. 13). The mesa above the cliffs is open rolling country covered with sage brush and native grass.

The day following our arrival we felt our way carefully around the base of the bluffs, at times starting displacements of rock that rolled, bounded and smashed their way to the foot of the slope below us. In the air there was an abundance of Cliff Swallows, intermixed with a number of Violet-greens and an occasional Swift; and we were, of course, constantly watching the last mentioned, alert to locate their entrance to and departure from crevices indicating nest sites. Several of these entrances were spotted which were inaccessible from above, owing not only to the extremely rotten and treacherous character of the surrounding material, but also to the fact that they were placed in steeples or pinnacles, separated from the main bluff. Crevices selected for nesting sites on the sides of these steeples were generally overhung by projecting rock. (See fig. 14.)

The first available prospect, located by Niedrach through the presence of excrement about eight feet up, and to which he was able to climb, was in a horizontal crevice about two and one-half inches in width, sloping slightly downward and partly filled, in places, with lava, sand and vegetable matter evidently deposited by the wind (see fig. 15). Upon reaching the crevice a Swift darted forth nearly in his face, and he caught sight of its mate retreating back into the crevice, from which it was not seen to emerge. Less than an hour's work resulted in collecting, from a point about eighteen inches back, our first nest, containing four fresh eggs.

This seemed so "dead easy" that we were greatly encouraged, and we soon spotted a second prospect in a nearly vertical crevice about ten feet up in a V-shaped chimney. This was overhung with such suspiciously loose looking material that we brought a couple of long cotton-wood fence rails from the river bank below and pried loose several hundred pounds of rock, large chunks of



Fig. 15. NESTING CREVICE OF WHITE-THROATED SWIFT, SHOWING METHOD OF GAINING ACCESS.

which bounded and smashed down the slope. Then, standing on Burns's shoulders, who in turn was braced by Oslar and myself, Neidrach commenced operation with hammer and chisel; but the material was hard and progress slow, and as the crevice made a bend beyond which he could neither see, feel nor locate with feelers, we abandoned it for the day.

Next day we packed in a six-foot ladder from which Neidrach resumed work, the bird being seen to enter the nest and to leave again. The ladder was steadied by Burns and Oslar, and after much work in cutting with pick, hammer and chisels, and bar, a falling rock suddenly struck Burns on the head, knocking him to the ground senseless for several minutes. Only quick action on the part of Oslar and myself saved Neidrach from taking a header from the

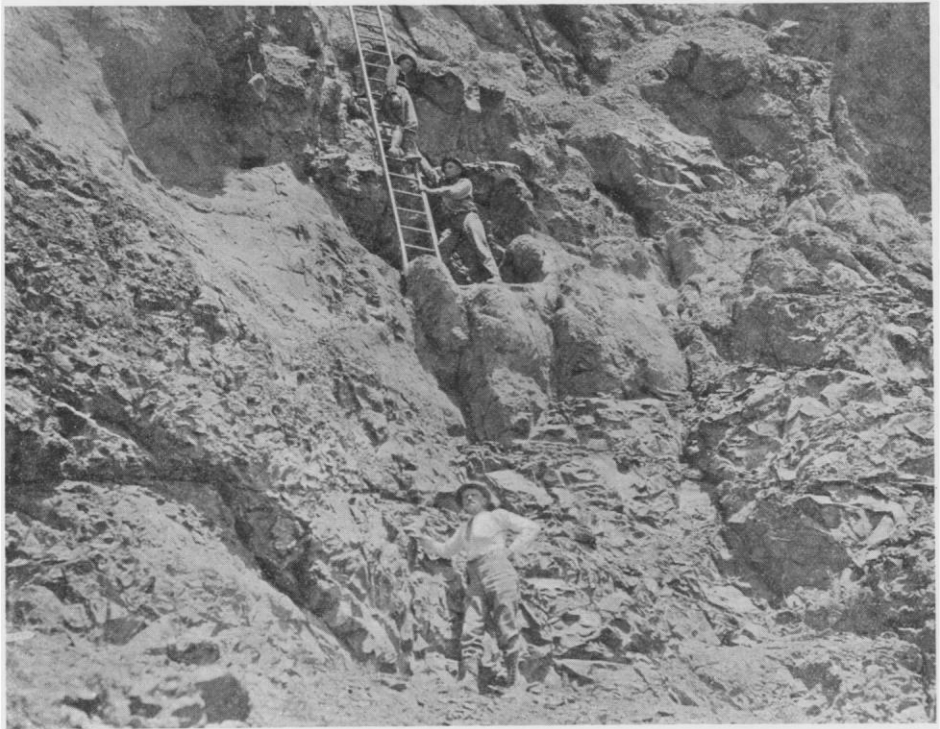


Fig. 16. MAKING THE SECOND LIFT TO REACH THE SITE OF NEST NUMBER TWO; W. C. BRADBURY IN FOREGROUND.

sliding ladder, and the work on that prospect was abandoned. Several other crevices were located that were inaccessible from above, though among them there were two about forty feet up and ten feet apart that it seemed might possibly be reached by ladders from below.

The next day I had hauled from the village and carried up the slope a sixteen-foot painter's ladder, and proceeded to work at the last-named prospects. The ladder was held by two men, while the third mounted to the first bench, where he supported the upper end of the ladder until the two others joined him. Then the ladder was drawn up, placed, and held almost by main strength on the uneven, crumbling footing, while the first available site was carefully explored. This proved to contain an unfinished nest only. The other prospect

could not be reached from this bench, nor was there any secure footing on which the ladder, after being drawn to the third lift, could be placed so as to reach the diagonal crevice to be explored. However, after securing the best rest possible for the upper end, the lower extremity was supported by two men on the insecure footing available, while the third man carefully climbed to the crack in the rock. From this point, and without any disaster, he secured nest number two, with four nearly fresh eggs, placed about two feet back in the crevice. (See fig. 16.)

While watching and admiring the powerful, graceful, and apparently effortless flight of these unrivalled masters of the air, I noticed what appeared to be a conflict in midair, in which two birds clinched, fluttered, and fell as if with broken wing, ten or twenty feet before separating. I had heard of their copulating in flight, but was still somewhat skeptical. Neidrach assured me, however, that he had frequently noticed this while in company with Mr. F. C. Lincoln, Curator of Ornithology, Colorado Museum of Natural History, who had taken them in the act. Mr. Lincoln verifies this statement and adds that in May, 1915, while on a collecting trip in the Paradox Valley, Colorado, he frequently observed this curious action. On two occasions he collected with a single shot the two birds while in the act, and both times one proved to be a male, the other a female. Examination of the sexual organs showed them to be in full breeding condition. The difference of about a month between the date of his observations and my own is accounted for by the difference in seasons, altitude and latitude.

The balance of the four days we spent at these cliffs was much a repetition of the foregoing, the nest sites discovered being protected by overhanging projections and mostly on the sides of inaccessible pinnacles. In one instance one was located on the face of the main bluff back of some steeples, perhaps one hundred feet below the mesa above, and thirty feet above the top of a chimney slide, to which one of the boys laboriously climbed. We anchored and lowered the swing outfit with a view of raising him to the nest, but the swing in passing the projections, and the manipulation of the rope afterwards, continued displacing such volumes of loose materials that it would have been suicidal to have attempted reaching the nest. A Raven's nest and also a Red-tailed Hawk's nest, similarly located at different points on the main cliff, were abandoned for the same reason.

This year (1917), with three assistants, I revisited this same site by automobile, when a day and a half of hard and conscientious work was but a repetition of the foregoing experience, except that no nests located could be reached from below or above, and none was taken. On my return to Denver, I

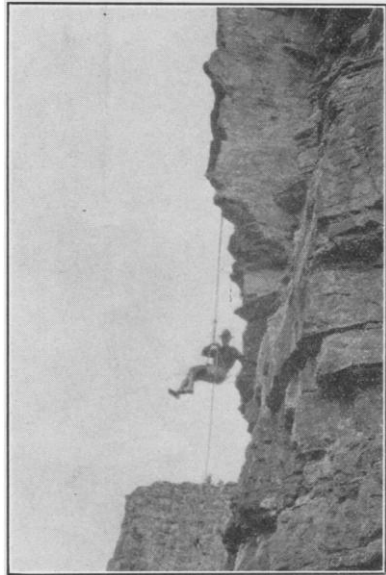


Fig. 17. FIFTY FEET FROM THE BOTTOM, BUT UNABLE TO REACH NEST SITE BENEATH PROJECTING ROCK.

dispatched a couple of experienced young field men to a site in a canyon at the base of Pikes Peak, this state, with full equipment and instructions to employ any necessary local assistance. They were on the ground seven days, during which time they spotted over a dozen nest sites. In every case the nests were located in soft crumbling limestone, and were mostly inaccessible from any point or by any means. A reference to fig. 17 will give a better idea of the

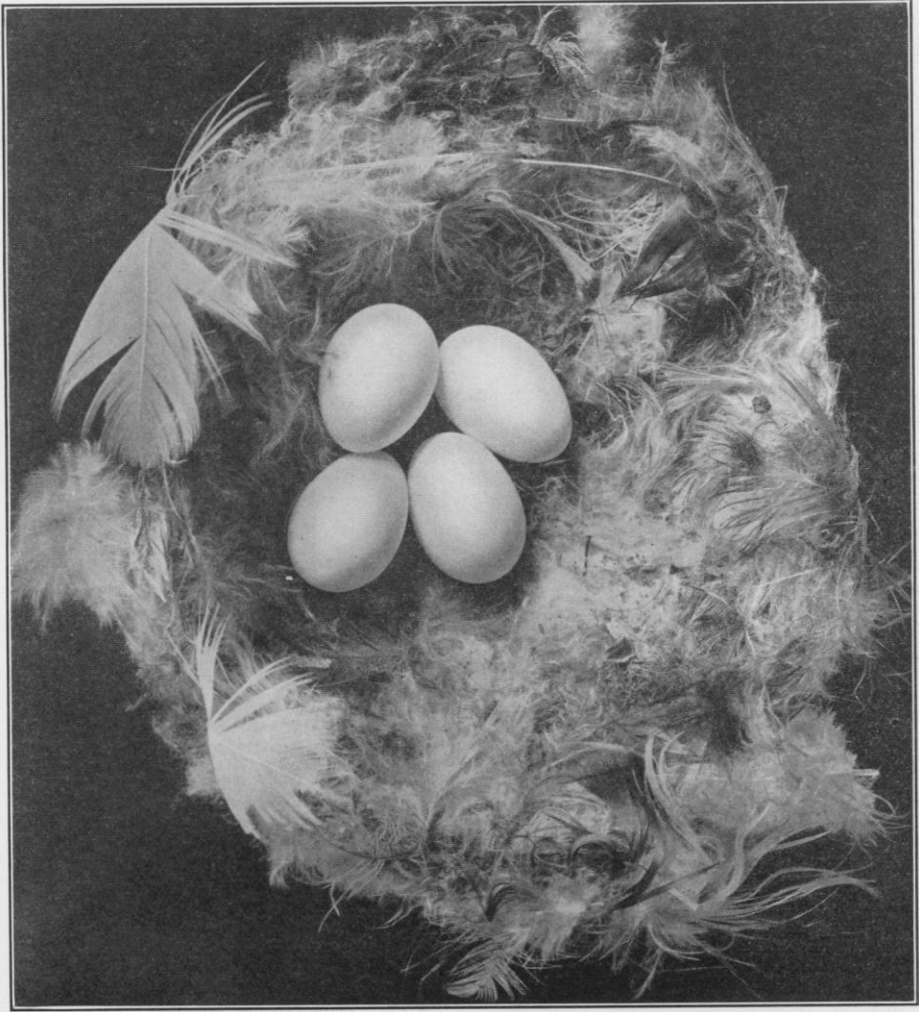


Fig. 18. NEST AND EGGS OF WHITE-THROATED SWIFT (SET NO. 1); TAKEN NEAR HOT SULPHUR SPRINGS, COLORADO, JUNE 24, 1916, BY W. C. BRADBURY.

Photo by J. D. Figgins.

methods employed than many words of mine would do.

The third day, July 12, they phoned me that they had spent a full day on one site to find only a half-completed nest, while most of their other attempts were equally unsuccessful. They had, however, located one promising nest in a crevice twenty feet back and twelve feet up, in a cave located 150 or more feet below the top of a cliff and seventy-five feet above the creek below. They

had succeeded in getting an extension ladder to this nest, and, without disturbing it, discovered that it contained two eggs.

On July 15, this nest was visited for the fourth time, the parent bird being present on each occasion, and as it still contained but two eggs, it was taken, together with the bird. One egg proved to be almost fresh, while the other was about one-third advanced in incubation; examination of the female proved that she would have laid no more. The nature of the cavity in which the nest was placed made it impossible to determine whether or not other eggs had been displaced from the nest and lost in the crevice.

#### MEASUREMENTS OF NESTS, IN INCHES

| Set No. | Outside |                    | Inside |                    |
|---------|---------|--------------------|--------|--------------------|
|         | Depth   | Length and breadth | Depth  | Length and breadth |
| 1       | 1.50    | 4.25x3.75          | 1.00   | 4.00x3.50          |
| 2       | .40     | 3.50x3.00          | .30    | 3.40x3.00          |
| 3       | 1.75    | 4.50x3.40          | 1.10   | 3.70x3.00          |

Nest no. 1.—Base or bottom, of feathers with slight intermixture of fine grass blades. The balance of the nest contains no visible vegetable matter whatever, but the whole structure is so thoroughly glued together that no feather or grass blade can be removed without tearing it loose. The mass is not stiff, but extremely soft and flexible. (See fig. 18.)

Nest no. 2.—This is a much more flimsy affair, as though finished in haste or the remains of an old nest, one side and the bottom being so thin as to be seen through. Probably 25 per cent grass and the balance feathers; the total bulk not one-third of that of no. 1 or 3.

Nest no. 3.—Is practically the same as number 1, except that an occasional spear of grass is visible. The whole nest, however, is probably 95 to 98 per cent feathers.

#### MEASUREMENTS OF EGGS, IN INCHES

| Set. no. 1 | Set no. 2 | Set no. 3 |
|------------|-----------|-----------|
| .86x.59    | .88x.52   | .91x.59   |
| .89x.58    | .92x.53   | .90x.58   |
| .87x.61    | .85x.54   |           |
| .89x.60    | .85x.56   |           |

Measurements by F. C. Lincoln, Curator of Ornithology, Colorado Museum of Natural History.

Nests nos. 1 and 2 when taken were teeming with vermin from the size of a bed-bug down, and upon arrival in Denver were placed in a tight box with carbon bisulphide for their destruction. To the bottom of each nest was attached considerable quantities of light downy fluffy material, seemingly the remains of feathers eaten by moths or other insects. The eggs were all more or less spotted with insect excrement, but by my failure to give explicit instructions to the contrary, this was washed off in blowing the eggs with water, but it still shows to some extent on set no. 3.

It is interesting to study the varying amount of ingenuity and apparent reasoning with which nature has endowed the different species to enable them to protect their nests and young during the breeding season. As examples: Protective coloration of eggs and young without nest, shelter, or cover, as in the Mountain Plover; the selection of an isolated, barren island, as in gulls; the retreat beneath the surface of the ground, a hole in a tree, the suspension from the end of a limb that will support neither mammal nor hawk; the secrecy and camouflage of the nest of the hummer, kinglet, etc.; the hasty covering of the eggs and the noiseless submersion of the grebe; the broken wing stunt of the Mourning Dove and many others; the trickery and subterfuge of the ptarmi-



gan, at other times relying solely on protective coloration; and on the face of a cliff between sky and water, as in the Cliff Swallow.

But the White-throated Swift has outwitted and outfitted them all in the selection of its nest site and construction of a comfortable nest,—out of reach of floods, storms, sliding rocks, reptiles, predatory mammals and birds, and the wisest ones beyond the depredations of the most enthusiastic oological crank unless the life of the latter is insured for twice its value! This bird has eliminated practically every danger to its home except the vermin, and why it has not figured this out also is difficult for me to understand.

*Denver, Colorado, February 11, 1918.*

## A RETURN TO THE DAKOTA LAKE REGION

By FLORENCE MERRIAM BAILEY

*(Continued from page 70)*

### II. BIRDS OF THE UNBROKEN PRAIRIE

THE LAND bordering the Sweetwaters was nearly all in grain, but three miles to the northeast, by the section lines, there was still a strip of original, unbroken prairie, as I found to my satisfaction when invited to a family dinner by the grandparents of our little school boy. As the farm-house was torn up by repairs at the moment, a "cook car" left in the yard by a threshing outfit, a car twenty feet long by ten wide stilted up on four wheels, was used as an emergency dining-room, greatly to my delectation, as it was my first opportunity to examine one. We climbed up the high front steps—taken in before starting on the road that the four horses might be driven from the front door—and as we sat on benches drawn up to the long table fitted to serve twenty or thirty men and I looked with curiosity at the stove at the end of the car and the protected trays for dishes against the walls, the old settlers told interesting tales of the early days on the prairie.

When they had come as pioneers in 1884, prairie fires were a real danger, it was an easy matter to get lost in the big sloughs with grass standing seven or eight feet high, and buffalo bones strewn the ground. Ox cart trains of Sioux, with squaws and papooses, used to come from Fort Totten to pick up the bones to ship out for fertilizer, and the primitive ungreased wooden carts with wheels five feet high—coming usually in trains of from seven to eleven but once in a train of twenty-eight cars—as the pioneer expressed it, "squawked so" they could be heard crossing the Belgrade Bridge four miles away. For four or five years after the first settlers came, the Indians kept on "picking bones", which gives a slight idea of the hordes of buffalo that once roamed that part of the prairie.

In the narrow strip of unbroken prairie that is left, a few Prairie Chickens were still to be found. When the hunting season opened, the sound of shots made the Grandfather exclaim regretfully, "He's got them!" But the only ones seen by me in the neighborhood were on the road between the two farmhouses